

AMERICAN MUSEUM NOVITATES

Published by

Number 1058

THE AMERICAN MUSEUM OF NATURAL HISTORY
New York City

April 15, 1940

A KEY TO THE KNOWN ANTHIDIINE BEES OF OREGON, WITH DESCRIPTION OF SOME NEW FORMS

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Several years ago I published a little paper (1930, Jour. N. Y. Ent. Soc., XXXVIII, pp. 10-14) based on anthidiine bees collected in Oregon and kindly submitted to me by Professor H. A. Scullen of the Oregon State Agricultural College. Since the appearance of this paper I have had opportunity from time to time to examine additional Oregonian specimens which Professor Scullen has been good enough to send me for identification. Recently a further shipment of Oregonian Anthidiinae has been received from Dr. George R. Ferguson of the Department of Entomology at Corvallis. These several shipments of bees have contained comparatively few new forms but they have been of distinct interest in showing the range and distribution within the state of the known forms. It seems in order to issue at this time a key to the Oregonian species and varieties of Anthidiinae, for after such assiduous collecting on the part of those connected with Oregon State Agricultural College the list is probably approaching completion. Nevertheless this statement may be premature, for the last shipment contained not only a species and two varieties believed to be new but also a specimen of *Callanthidium illustre* of which I had not hitherto seen examples from the state. The specimen of *illustre*, a male, was collected at Medford, at an elevation of 1375 feet on June 20, 1937 (Bolinger-Jewett).

KEY TO OREGONIAN ANTHIDIINES.

MALES

- 1.—The tarsal claws without a clearly developed pulvillus.....2.
A well-defined pulvillus present between tarsal claws.....14.
- 2.—The outer recurrent nervure going beyond the end of the second cubital cell. Large bees, 13 to 15 mm. in length, richly maculated. (*Callanthidium*).....3.

The second recurrent nervure not going beyond the end of the second cubital cell, completely interstitial with second transverse cubital nervure. (*Anthidium*).....4.

- 3.—The middle of the pygidium with an acute spine that extends nearly as far apically as the slightly produced tips of the broad lateral lobes. The clypeus yellow.....*formosum* (Cresson).

The middle of the pygidium with a blunt short spine or tubercle that is far basad of the tips of the somewhat triangular lateral processes. The clypeus yellow with a large black median area.....

-*illustre* (Cresson).
- 4.—The front dull with a dense, microscopic, granular surface, which is dotted over somewhat sparsely and irregularly with clearly defined and on the whole fairly well-separated punctures. Tergites 1-5 of the abdomen each with four spots that are rather triangular in shape. The spines on the sides of segment 6 rather strongly incurved and somewhat hooklike in appearance. The lateral processes of the pygidium very long and spiniform.....*maculosum* Cresson.

The front rather uniform in appearance, closely and somewhat indistinctly punctured.....5.

- 5.—The last visible sternite with a sharp triangular emargination at the middle of its apex in addition to having a spine at each of its lateral extremities. The pygidium crescentic in outline if the central spine be disregarded. The tibiae without maculations (except sometimes at the apex of the fore tibiae).....

.....*palliventre* Cresson.

- The middle element of the last visible sternite entire at the apex.....6.
- 6.—The lateral processes of the pygidium narrow and usually elongate, the distance separating them from the central spine being usually two or more times their width, fingerlike or semi-spinelike in character.....7.

The lateral processes broad: rounded or truncate at their apical end or rather widely angulate, not narrowly produced.....8.

- 7.—The clypeus with a distinct impress or a dimple at the middle of the apex.

- The tibiae extensively maculated. The pygidium red and the under side of the abdomen as well as the tergites (except for their usually heavy yellow maculations) more or less suffused with red. *edwardsii* Cresson.¹
- The clypeus not dimpled, perfectly arched along the apex, only the contour of which is very slightly emarginate to subtruncate. The front and middle tibiae maculated at the apex but not at the base. The pygidium, like the ground color of the rest of the abdomen, black. *banningense* Cockerell.
- 8.—The lateral processes of the pygidium short, broad, and usually truncate at the apex, two or more times the width of the space separating them from the central spine, which terminates about on a level with them. Maculations cream-colored, usually lacking on tubercles, mesonotum, and scutellum. *divisum* Cockerell (= *brachyurum* Cockerell).
- The lateral processes of the pygidium relatively long, extending beyond the apex of the central spine, and more or less rounded or angulate at the tip. 9.
- 9.—The apex of the tibiae with a large yellow maculation that is much more conspicuous than the reduced maculation at the base of the tibiae. Tergite 1 with a yellow spot at each of its lateral extremities separated by a wide area of black, rarely with two more or less specklike, median spots as well. The apical margins of the abdominal tergites densely punctured. *nebrascense* Swenk.²
- The tibiae wholly maculated or with basal maculations that at least on the middle and hind pair are more conspicuous than the apical maculations if such be present. 10.
- 10.—The tibiae externally completely or almost completely maculated. 11.
- The tibiae with a basal spot or with a basal stripe that does not extend to the apex. The maculations of thorax, legs, and abdomen cream-colored. 12.
- 11.—The middle of the apex of the clypeus with a dimplelike depression, not merely an emargination. The maculations very pale yellow. *permaculatum* Cockerell.
- The apex of the clypeus with merely a curvilinear emargination at its middle. The maculations tending to lemon-yellow. *mormonum* Cresson.
- 12.—Tergite 1 immaculate. *tenuiflorae* variety *yukonense* Cockerell. Tergite 1 with usually four maculations. 13.
- 13.—The venter with silvery gray hairs. The tubercles immaculate. The lateral members of the last visible sternite prolonged fingerlike or spinelike, ending about on a level with the middle member. *tenuiflorae* Cockerell.
- The venter in almost all cases with at least some black hairs, these sometimes predominant. The tubercles almost invariably maculated. The lateral members of the last visible sternite somewhat more triangular in shape, a little less attenuated apically, and ending on a level distinctly below the middle member. *atriventre* Cresson.³
- 14.—The scutellum broadly truncate posteriorly. The tubercles somewhat carinate above, not with a scalelike extension anteriorly. The lateral face marks terminated at the level of the insertion of the antennae. Segment 6 with a distinct, if low, glistening carina and an inverted T-shaped figure in black, one arm of which occupies the space between the strong tuberculate prominences. The pygidium faintly bilobed, or shallowly emarginate at the apex, with a sub tuberculate prominence at the point of junction of the two lobes. *Anthidiellum robertsoni* (Cockerell).
- The scutellum more or less rounded behind or even faintly emarginate. The tubercles extended scalelike anteriorly (*Dianthidium*). 15.
- 15.—Legs ferruginous to the exclusion or virtual exclusion of yellow or cream-colored maculations. The maculations of the thorax more or less suffused with ferruginous. Abdominal tergites with distinctly yellow maculations superimposed usually on a reddish and black (rarely wholly reddish or wholly black) ground, the black largely confined to the basal area, the red to the apical region of each tergite. The pygidium apically truncate, with a small median tooth, very briefly separated by a shallow notch from the truncation to each side of it and extending very slightly beyond that truncation. *sayi* Cockerell.
- The maculations of the legs and thorax, at least, without red. 16.
- 16.—The pygidium continuously truncate along its apical contour except for rounding at each of its lateral extremities and a small median tooth that appears merely as a projection on the otherwise uninterrupted truncate edge. The maculations variable but as a rule rather rich. *ulkei* (Cresson).

¹ *A. tricuspidum* Provancher is a not very clearly separable variety and *A. depressum* Schwarz an extreme case of undermaculation of *edwardsii*.

² Although I have not seen the type of *nebrascense*, what I have interpreted as *nebrascense* is structurally like *mormonum* and perhaps should be regarded merely as the undermaculated extreme of this rather variable species. See Schwarz, 1928, Canadian Entomologist, LX, pp. 213-214; also comments in the present paper.

³ Probably what I described in 1930 (Journ. N. Y. Ent. Soc., XXXVIII, pp. 10-13) as *sculleni* should be merged with *atriventre*.

- The pygidium either not truncate apically or with the median tooth clearly separated from the lateral lobes. 17.
- 17.—The apical contour of the pygidium insloping from each side upon the base of the median tooth, and as a result very broadly V-shaped if the median tooth be disregarded. 18.
- The median tooth of the pygidium clearly separated by a hemispherical emargination from the apically rather truncate lateral lobes. 19.
- 18.—Maculations rather full: the scutellum with a stripe along its posterior margin; the stripes on the tibiae very broad and long, covering the entire exterior face of the joint to the virtual exclusion of black; the two halves of the bands on tergites 2-5 invaded by black posteriorly but not completely penetrated. *heterulkei*, new species.
- Maculations more restricted: scutellum immaculate; the stripes on the fore and middle tibiae linelike and interrupted, the hind tibiae with merely a basal spot; abdominal bands disintegrated into four spots on tergites 2 and 5. *heterulkei* variety *cornucopiana*, new variety.
- 19.—The median tooth of the pygidium separated from each lateral lobe rather broadly (by nearly the width of the lateral lobe at its apex), somewhat down-slanting (best seen when the insect is viewed from the side) and long, extending well beyond the lateral lobes. 20.
- The median tooth separated from each lateral lobe by much less than the width of the lateral lobe, not down-slanting, virtually on the same level as the lateral lobes and coextensive with them. 21.
- 20.—The apical rims of the tergites black. The apical sternite emarginate at its apical middle. *pudicum* (Cresson).
- The apical rims of the tergites reddish or reddish brown. The apical sternite scarcely or not at all emarginate. *dubium* Schwarz.
- 21.—Scutellum posteriorly maculated. *parvum* (Cresson).
- Scutellum immaculate. *parvum* variety *subparvum* (Swenk).

FEMALES

- 1.—The tarsal claws without a clearly defined pulvillus. The mandible with a number of closely placed teeth of somewhat irregular size. 2.
- A well-defined pulvillus present between the tarsal claws. 16.
- 2.—The outer recurrent nervure going beyond the terminus of the second cubital cell. Large bees (11 to 15 mm. in length), richly maculated. The lateral face marks extending about to the level of the anterior ocellus. The last tergite with a tooth at each side midway down the seg-

ment and with two much larger lobelike structures at the tip, formed by a semi-circular emargination of the apex. (*Calanthidium*) 3.

The second recurrent nervure not going beyond the second cubital cell but interstitial with second transverse cubital nervure. The lateral face marks often lacking; when present, terminating at a level not above that of the base of the antennae. (*Anthidium*) 5.

- 3.—The mandible with 7 teeth: The sixth tergite with usually a black spot imbedded to each side in the yellow area but without a ribbon of black bisecting the segment medianly. The two lobes at the apex broadly rounded. *illustre* (Cresson).

The mandible with 6 teeth. The last tergite without black spots imbedded in the yellow but with a median black band bisecting the tergite longitudinally. The two apical lobes somewhat less rounded, more acute. 4.

- 4.—The mesonotum without L-shaped maculations bordering its anterior margin and sides. *formosum* (Cresson).¹

The mesonotum with L-shaped maculations *formosum* variety *consonum* (Cresson).²

- 5.—The front dull with a dense, ultramicroscopic, granular surface, over which are scattered irregularly and rather sparsely certain clearly defined and non-cancellate punctures. The sides of the face immaculate but the lower half of the clypeus with two large spots. Tergites 1-5 of the abdomen each with four maculations of triangular or subtriangular shape. Tergite 6 immaculate, with strongly developed lateral teeth; the contour beyond the teeth sinuate; a depression toward the apex on each side of the median longitudinal carina. *maculosum* Cresson.

The front rather uniform in appearance, with densely crowded punctures. The abdomen sometimes four-spotted on some but not on all of the first five

¹ What is here designated *formosum* is the insect which Cresson described in 1879 as *conspicuum* on the basis of the female. There is, it would seem, a curious absence in the literature regarding either the female of *formosum* or the male of *conspicuum*. Cockerell (1909, Entomol. News, XX, p. 262) alludes to the male of *conspicuum* but the characters that he gives in his key to *conspicuum* and its close relatives fit the male of *formosum* perfectly and *formosum* is not mentioned in the key. In my estimation *formosum* and *conspicuum* are the same insect; the name *formosum* has priority.

² In view of the interpretation in the previous footnote, what Cresson designated as *illustre* variety *consonum* (1879, Trans. Amer. Entomol. Soc., VII, p. 207) and what subsequently I designated *conspicuum* variety *consonum* (1928, Journ. N. Y. Entomol. Soc., XXXVI, p. 391) should now be called *formosum* variety *consonum*. The form *consonum* is merely one extreme of maculation, more or less connected through intergrades with the less maculated, typical *formosum*.

- tergites, which for the most part have merely medianly divided bands. 6.
- 6.—The clypeus and sides of face black. 7.
The clypeus and the sides of the face maculated. 12.
- 7.—The legs wholly black, without maculations even on the tibiae. 8.
The legs with maculations on the tibiae. 9.
- 8.—The tubercles, the axillae, and the posterior rim of the scutellum maculated. The last tergite with two unusually well-developed sharp teeth. 9.
..... *banningense* Cockerell.
The tubercles, axillae, and scutellum black. Hairs of mesonotum usually strongly orange-colored. *palliventre* Cresson.
- 9.—The ventral scopa almost invariably black or prevailing dark. The face below the antennae often with considerable black hair. The maculations at the base of the tibiae often extended well down the joint. Either the axillae and posterior margin of scutellum or merely the scutellum usually maculated. *atriveatre* Cresson.
The ventral scopa silvery gray or silvery gray laterally deepening to yellowish in the middle. The face below the antennae with only pale hairs. The axillae and scutellum black. 10.
- 10.—The tibiae with large maculations at the apex but without maculations at the base of at least the front and middle pair. The punctuation on the apical rims of the abdominal tergites very dense, without shiny interspaces. The apical tergite rather notably emarginate on each side between the blunt lateral tooth and the truncate apex of the segment. Abdominal maculations yellowish. *wallisi* variety *wallowana*, new variety.
The tibiae with a small pale spot only at the base, no maculation at the apex. The punctuation on the apical rims of the abdominal tergites less crowded, with shiny interspaces between the punctures. The sides of the apical tergite beyond the teeth, which are less prominent, only very briefly emarginate. The abdominal bands usually paler, inclining to cream-color. 11.
- 11.—Tergite 1 of the abdomen either four-spotted or with a medianly interrupted band the two halves of which are either emarginate or with an imbedded black spot. *tenuiflorae* Cockerell.
The maculations on tergite 1 reduced to a spot at each lateral extremity. *tenuiflorae* variety *yukonense* Cockerell.
- 12.—Tergite 6 virtually without angulation, presenting a smooth, uninterrupted contour. The apical part of the tergites (that part posterior to the maculations) densely and minutely punctate, dull in appearance. The clypeus yellow except for a rather broad stripe of black down the middle. *edwardsii* Cresson.
The lateral angles of tergite 6 thrown into prominence by a more or less sharp bend in the contour, with resulting small toothlike or subtoothlike projections. 13.
- 13.—The maculations on tergite 1 of the abdomen confined to a spot at each lateral extremity. *nebrascense* Swenk.
The maculation of tergite 1 more extensive. 14.
- 14.—The clypeus bimaculate, with the spots confined to its lower half; in rare cases a third spot between the lateral spots. The side-facial maculations not completely filling the space between the clypeus and the inner orbit of the eye. The tibiae not wholly maculated externally but with merely a more or less stripelike maculation. *divisum* Cockerell (= *brachyurum* Cockerell).
Not presenting this combination of characters. 15.
- 15.—The maculations pale yellow. The maculations of the clypeus confined to a spot on each side, which usually, however, extends from base to apex. *permaculatum* Cockerell.
The maculations lemon yellow. The clypeus typically wholly maculated but sometimes more or less invaded by black, especially basally. *mormonum* Cresson.
- 16.—The posterior margin of the scutellum broadly truncate. The tubercles carinate above, but without a scalelike expansion anteriorly. The clypeus black; the sides of the face maculated to the level of the base of the antennae. *Anthidiellum robertsoni* (Cockerell).
The scutellum more or less rounded posteriorly or even faintly emarginate. The tubercles with a scalelike prolongation anteriorly. (*Dianthidium*) 17.
- 17.—The legs largely or wholly ferruginous. Tergites 1-2 of the abdomen, and often also tergite 3 with usually much red apically and sometimes basally. *sayi* Cockerell.
The legs largely black and yellow to cream colored, or mainly black, or mainly yellow. 18.
- 18.—The apices of the abdominal tergites, particularly those of the basal tergites, strongly invaded by rust red. The basal half of the mesopleura with a large maculation. The apical one-third of the mandibles rust red. *dubium* Schwarz.
The apices of the abdominal tergites black. 19.
- 19.—The maculations cream-colored. The tibiae usually with merely a spot at the base. *pudicum* (Cresson).
The maculations of deeper hue, lemon yellow. 20.
- 20.—Rather fully maculated, with as a rule some or all of the following marks: large spots

on the clypeus, supraclypeus, mark on front, tibiae more or less completely maculated, stripes on femora, medianly divided bands on tergites 2-5, sparingly or even not at all emarginate posteriorly.....*ulkei* (Cresson).¹

The spots on clypeus usually small, sometimes absent. Usually only basal spots or short stripes on tibiae.....21.

21.—The scutellum maculated posteriorly.....*parvum* (Cresson).

The scutellum immaculate.....*parvum* variety *subparvum* (Swenk).

***Anthidium wallisi* variety *wallowana*, new variety**

Also a discussion of ***Anthidium nebrascense* Swenk**

♀.—HEAD black, with the only maculation a roundish yellow spot above the summit of the eye. The eye greenish gray mottled with black toward its inner half. The head densely and somewhat cancellately punctate. The mandibles sexdentate. The clypeus emarginate along the middle, flanked by two rather well-developed teeth on each side, the inner teeth slightly the larger. The hair long, silvery gray, somewhat more yellowish on the vertex.

THORAX with mesonotum and mesopleura punctured much like the head. Tegulae more lightly and sparsely punctured, particularly toward the summit, which is rather shiny. Thorax black, wholly without maculations, with longish silvery gray hairs at the sides, more yellowish hairs on the mesonotum and scutellum. The propodeum dull with a dense, fine, granular tessellation, on which are traceable, particularly near the base, faint blotchy shallow punctures where the hairs emerge.

LEGS mostly black; small tarsal joints (except for the darkened teeth on the claws) bright reddish. No yellow maculations except on the tibiae, all of which have a subapical stripe on their outer face but lack a basal spot except in the case of the hind pair. Hairs silvery gray except for the pale golden brushes on the inner face of the metatarsi and the red spines on the smaller tarsal joints.

WINGS very slightly fuliginous, particularly in the upper half of the marginal cell and toward the apex. The stigma and venation fuscous. The number of hamuli in the lower wing 21.

ABDOMEN black, with lemon-yellow maculations on all the tergites. On tergite 1 there are two large lateral spots and two diminutive linear inner spots. The maculations on tergites 2-5 consist of a medianly divided band, the halves of the band progressively more approximate from tergite to tergite, very narrowly separated on tergite 5. Above, the halves of the band are deeply but rather narrowly emarginate in the case of tergites 2 and 3; with only a

specklike emargination above on tergite 4; only sinuous above on tergite 5, the halves of the band on this tergite being of rather uniform width throughout, instead of the inner element being smaller than the outer as is the case on the halves of the bands on the other tergites. Tergite 6 bimaculate, each maculation rounded and thick on the inner side, more narrowed toward the outer side, with a notchlike emargination above at the middle. The sculpturing punctate-tessellate on the basal parts of the tergites, the punctation denser and less indistinct on the black areas than on the yellow bands; especially dense and without shiny interspaces on the apical rims of tergites 1-5. Tergite 6 with a rather decisive emargination between the large, blunt lateral tooth (about midway down the side) and the truncate apical end of the segment. The ventral scopa silvery gray, the dorsal hairs ochraceous.

Length 8 mm.; width $2\frac{3}{4}$ mm.; length of forewing, including tegula, 7 mm.

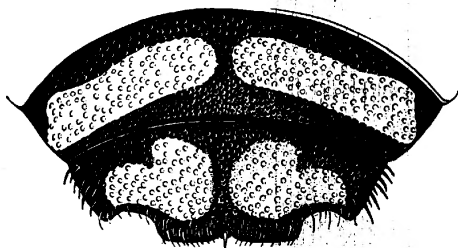


Fig. 1. The last two abdominal tergites of *Anthidium wallisi* variety *wallowana*, new variety, ♀ (holotype).

OREGON.—Lick Cr. RS, Wallowa National Forest, 4600 feet, Aug. 16, 1937 (Bolinger-Jewett).

I have not seen the type of *wallisi*, but such characters in Cockerell's description (1913, Can. Ent., XLV, p. 13) of that insect as "lateral toothlike angles of sixth abdominal segment very prominent; broad depressed apical margins of abdominal segments excessively, minutely and densely punctured, not shining (shining and less densely punctured in *tenuiflorae*)" make it seem likely that the two insects are structurally alike. Moreover, Cockerell's description applies in the main, too, as regards maculation. The present insect differs in having the face entirely immaculate, the hind basitarsi immaculate, tergite 2 bimaculate instead of quadrimaculate, and the wings not "strongly brownish." However, the characteristic maculation of the tibiae, with the stripes

¹ See also description of putative female of *Dianthidium heterulkei*, new species.

on the lower part of the joint instead of the upper, the lack of maculation on the thorax, and in the main the abdominal maculations indicate similarity in the appearance of the two insects.

If I am right in interpreting *wallisi* as structurally like the insect before me, then I am inclined to reiterate a suggestion made years ago (1928, Can. Ent., LX, pp. 213-214) that *nebrascense* Swenk is merely a more fully maculated example of *wallisi*, which has priority by a year. More fundamentally *wallisi* (if correctly interpreted), *nebrascense*, and the present insect are all structurally so like *mormonum* that they can be definitely assigned to the *mormonum* complex. *Anthidium nebrascense* was described from Nebraska (1914, Univ. Studies Univ. Nebraska, XIV, pp. 14-15). The following year Swenk recognized it from California and Cockerell (1924, Proc. Calif. Acad. Sci., (4) XIV, pp. 345-346) reported it also from California. I have seen what I have interpreted as *nebrascense* not only from California and Oregon but also from British Columbia (1928, Can. Ent., LX, pp. 213-214). The dense punctation on the apical rims of the abdominal tergites that characterizes *wallisi* and *wallowana* is characteristic also of the males that I have interpreted as *nebrascense* just as it is characteristic of both sexes of *mormonum*. The pygidium of *wallowana* is strikingly like that of the female of *mormonum* just as the armature of the last visible sternite of what I have interpreted as the male of *nebrascense* agrees with the corresponding structure of the male of *mormonum*.

There is doubt in my mind whether Swenk's allotype of *nebrascense* is correctly associated with the male holotype. The allotype is from Wyoming and its pygidium is "rounded, with short lateral spines," whereas in *mormonum* and *wallowana*, at least, the apex of the female is truncate.

Dianthidium heterulkei, new species

♂.—Black, with lemon-yellow maculations.

HEAD with maculation over entire clypeus except for narrow apical border of blackish brown, stripe along the inner orbit of the eye (broad below, filling the space between eye and clypeus, thence tapering off to terminate about

on a level with the anterior ocellus), a continuation of this stripe briefly just below the summit of the eye along the upper third of the outer orbit of the eye, sometimes a small supra-clypeal triangle (holotype), outer face of mandible except for the black apex, which has a tooth on the outer half and the inner half concealed by a dense patch of light brownish hair.

THORAX with lemon-yellow maculations in following regions: a spot on each side of the anterior border of the mesonotum that is about as long as the distance separating it from the antero-lateral angle of the mesonotum, tubercles on their outer half, anterior half of tegulae with outer border hyaline, narrow stripe posteriorly bordering scutellum, sometimes interrupted at the middle (holotype) and sometimes extended on to the axillae.

LEGS with lemon-yellow maculations in the following areas: middle and hind femora briefly above at the apex, stripes below on the apical half of the front and middle femora (holotype) or sometimes lacking on the middle femora, very broad stripes from base to apex (holotype) or nearly the apex (paratype) on the outer face of the front, middle, and hind tibiae, those on the hind tibiae invaded by a large black spot anteriorly about half way down the joint, all of the metatarsi externally, and the rather long and robust spine on the hind coxae. The spurs on the hind tibiae reddish hyaline to yellowish.

WINGS slightly smoky, more especially so in the upper half of marginal cell and toward apex. Stigma reddish brown; venation fuscous to black. The second recurrent nervure extends beyond the second transverse cubital nervure about as far as the first recurrent extends beyond the first transverse cubital. Number of hamuli per hind wing from 12 to 14.



Fig. 2. The pygidium of *Dianthidium heterulkei*, new species, ♂ (holotype).

ABDOMEN with tergite 1 three-spotted, the central maculation more linear than the lateral ones, tergites 2-5 with two somewhat hemispherical maculations that are posteriorly emarginate and narrowly separated at their down-curved inner extremities, on tergite 2 so narrowly that they tend to unite (holotype). Tergite 6 entirely black or with a small maculation near the apex at the middle (holotype). Segment 7 maculated except for a narrow area of black at the base and a narrow hyaline border apically. Tergite 6 has a clearly defined longitudinal carina. Tergite 7 also with a strong median longitudinal carina that terminates in a short but prominent tubercle-like tooth. The apical contour of the pygidium slants inward from each side to join the base of this tooth.

Punctuation dense on head and thorax, sparser and in the black areas, at least, more distinct on abdomen.

Hair of head, thorax, legs, and abdomen silvery gray except for the under side of the metatarsi, which have the hairs yellowish.

Length 7 mm.; width $2\frac{1}{2}$ mm.; length of forewing, including tegula, about 7 mm.

♀.—Black, with lemon-yellow maculations.

HEAD with a maculation at each side of clypeus that extends from base to apex; lateral face marks broad below, filling the space between clypeus and inner orbit of eye, extending attenuated to level of anterior ocellus, and continued (after an interruption at the summit of the eye) somewhat broadened along the upper third of the outer orbit of the eye. A faint spot below anterior ocellus. Clypeus slightly emarginate at the middle. Mandible with two teeth on outer half of apex, followed by a slight emargination that terminates at the inner angle of the apex.

THORAX as described for male except that apical band rims uninterruptedly both the axillae and scutellum.

LEGS with the knees of the middle and hind femora briefly maculated as in the male but with a stripe beneath only toward the apex of the front femora (as in one of the male paratypes). The stripes on the outer face of the front and middle tibiae, like those of the male, rather broad and extending from the base almost to the apex. The hind tibiae with a large basal spot that extends narrowed about half way down the posterior margin of the joint, which is otherwise black. Spines on hind tibiae reddish. Metatarsi immaculate.

WINGS as described for male. Number of hamuli per hind wing 14.

ABDOMEN maculated much like that of male, trimaculate on tergite 1 and bimaculate on tergites 2-5, these maculations being, as in the male, hemispherical but less emarginate with black posteriorly and rather more widely separated (especially on tergites 3-4), not in the least in danger of coalescing. A median longitudinal carina faintly traceable (not nearly so distinct as in the male) on the densely punctured black tergite 6, which has only two specklike maculations that are easily overlooked.

Punctuation and coloration of hairs as described for male. Ventral scopa silvery gray.

Dimensions same as for male.

OREGON.—Elk Lake, Deschutes National Forest, elevation 4600 feet, Aug. 21, 1937 (Bolinger-Jewett), holotype, allotype, and 1 paratype; Diamond Lake, Douglas County, elevation 5182 feet, Aug. 27, 1937 (Bolinger-Jewett).

The male of this species differs structurally from the male of *parvum* and of *pudicum* in that the broad area to each side of the central tooth of the pygidium is not

decisively separated from that tooth by what in *parvum* and *pudicum* amounts usually to a rather semicircular emargination; instead, the sides of the pygidium slant inward gradually to unite with the base of the tooth. From the pygidium of the male of *ulkei* the pygidium of *heterulkei* differs also through the inslanting character of its sides, these being emphatically truncate in *ulkei*. It differs also in the greater prominence of its middle tooth, the tooth of *ulkei* appearing like an excrescence on the truncation. In *pudicum* the central tooth extends far beyond the lateral lobes of the pygidium, in *ulkei* slightly beyond the truncation, in *parvum* and *subparvum* it ends at the same level as the lateral lobes. In contrast to these conditions the central tooth of the pygidium of *heterulkei* actually does not quite reach the level of the outer extremities of the sides of the pygidium. The pygidial structure of *heterulkei* resembles, indeed, very closely that of *Dianthidium cressoni* Dalla Torre (= *venustum* Cresson) and in the maculation of these two bees, as well, there is considerable parallelism. But *heterulkei* is at once separable by its notably smaller size, 7 mm. as against 11 mm. in the case of *cressoni*, and its maculations lack the fullness attained by those of *cressoni*.

The allotype of *heterulkei* comes from the same locality as the holotype and one of the paratypes and has data on the label that are identical with the data pertaining to them. In its maculations it also so closely approximates those of the male that there can be little doubt that the two sexes are correctly associated. In appearance the female closely approximates that sex of *ulkei* and it is difficult in the key to give characters that have final validity due to the variability in the maculations of *ulkei* and the further fact that only a single specimen of the putative female of *heterulkei* is available for comparison. If this female is representative of the species, then this sex of *heterulkei* is apt to be less maculated than the corresponding sex of *ulkei*, more nearly approaching *ulkei* variety *riparii* Schwarz (1928, Journ. N. Y. Ent. Soc., XXXVI, pp. 399-400) in its

maculations than typical *ulkei*. Like *ulkei* variety *riparii* and like certain Oregonian representatives of *ulkei*—those from Three Rivers and Antelope Mt., which are available for comparison—the female of *heterulkei* has posterior emarginations on all the abdominal maculations from tergites 2–5. It differs from these other Oregonian specimens in having only specks on tergite 6 where they have well-developed spots, in lacking a mark on the mesopleura and in having only a faint mark on the front, but the differences are so slight as to make it uncertain whether what is here associated with *heterulkei* as its female is separable from *ulkei* females, and so I have not attempted to make a separation in the key. The allotype of *heterulkei* is not quite so fully maculated as is the female of *cresoni* and is much smaller.

***Dianthidium heterulkei* variety
cornucopiana, new variety**

♂.—Structurally and in the color of its hairs like the male of typical *heterulkei* but with reduced maculations.

Head with the maculations indicated for typical *heterulkei* but lacking the supraclypeal triangle; thorax without the stripe bordering the posterior rim of the scutellum; legs with stripe below on middle femora lacking and the stripes on the outer face of the tibiae much narrowed and reduced, discontinuous on front and middle tibiae, shrunken to a basal spot on hind tibiae. The maculations on the tergites of the abdomen similar to those of the typical variety but much more deeply emarginate with black posteriorly, tergites 2 and 5 being quadrimaculate due to the complete penetration by black on each of the lateral halves of the band, tergite 6 wholly black and tergite 7 more extensively black basally.

OREGON.—Queen Mine above Cornucopia, elevation 5000 feet, Aug. 2, 1937 (Bolinger-Jewett).